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(71) Applicant(s)
Corin Medical Limited

(Incorporated in the United Kingdom)

The Corinium Centre, Chesterton Lane, CIRENCESTER, Gloucestershire, GL7 1YJ, United Kingdom

(72) Inventor(s)
Paul Aichroth
George John James Cremore

(74) Agent and/or Address for Service
Marks & Clerk
57-60 Lincoln's Inn Fields, LONDON, WC2A 3LS, United Kingdom

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(54) Surgical anchor

(57) An anchor (10) for anchoring a ligament or the like (44) at or adjacent one end of a bore or channel (40) in a bone (42) comprises a head portion (12) and a rear portion (14) adapted to extend into the bore or channel (40) and to receive the ligament. This has the effect of shortening the distance to be covered by the ligament which allows the surgeon greater flexibility in tensioning and anchoring. In a further embodiment, the head portion of the anchor is connected to the rear portion by a universal joint and the rear portion has telescopic legs (Fig. 4 - not shown).

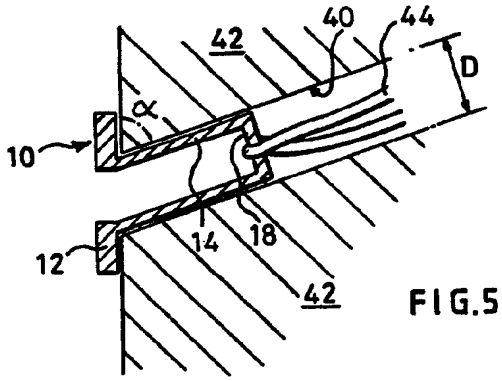

FIG.5

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

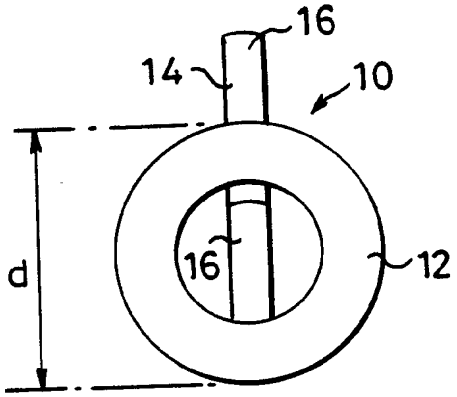

FIG.1

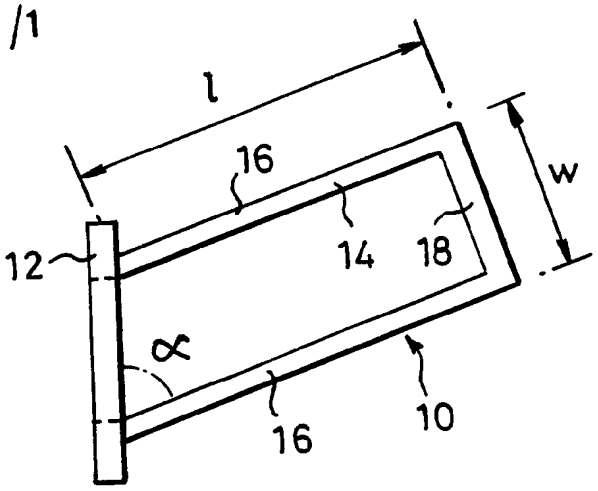

FIG.2

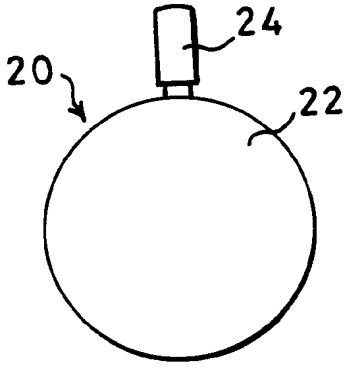

FIG.3

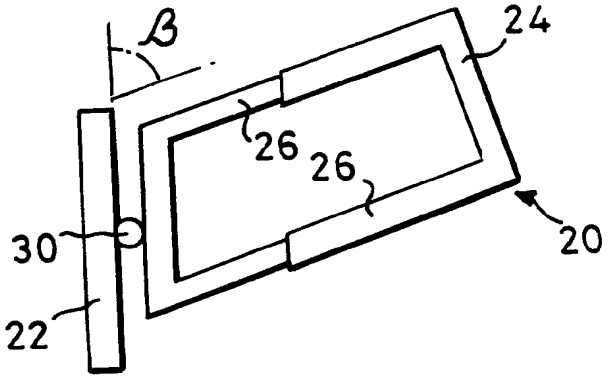

FIG.4

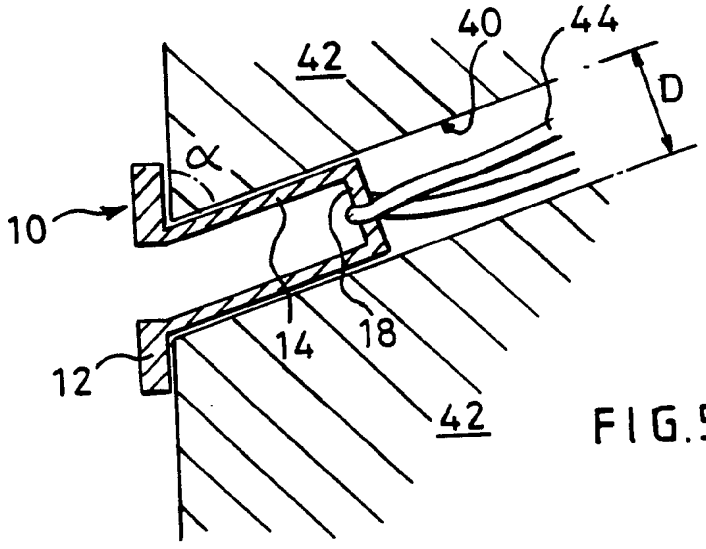

FIG.5

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SURGICAL ANCHOR

The invention relates to a surgical anchor, particularly but not exclusively to a surgical anchor for anchoring ligaments, for example, when the appropriate ligament has been passed through a channel or bore in a bone.

Injuries or repairs to a knee joint can involve damage to one or both cruciate ligaments which provide anterior-posterior stability to the knee joint. When such damage occurs, a common method of repair involves utilising an auxiliary ligament, which can be taken from the Achilles and other tendons, alongside the damaged ligament whilst natural healing takes place, although the damaged ligament may be removed in certain situations. Alternatively, the auxiliary ligament may be a prosthetic ligament.

The auxiliary ligament is passed through an appropriate inclined channel or bore in the head of the femur or tibia, slipped through an anchoring washer or the like and passed back along the channel or bore before being suitably tensioned and anchored. However, in most cases the length of the Achilles tendon is not quite sufficient for this method to be wholly

satisfactory. Either the angle of inclination of the bore or channel must be altered which results in imperfect stablisation of the knee joint, or the surgeon performing the operation may be tempted to overtension the auxilliary ligament which leads to incorrect stabilisation in the patient.

An object of the invention is to provide a surgical anchor which obviates the above disadvantages and which facilitates the carrying out of repairs to the cruciate ligaments.

The invention provides a surgical anchor as claimed in claim 1. Advantageous features are set out in the subsidiary claims.

The advantage of the surgical anchor of the invention is that the extension of the rear portion into the bore or channel effectively reduces the length of the bore or channel by the length of the rear portion. This means that, when the auxilliary ligament is passed along the bore or channel in both directions, a length of ligament equal to twice the length of the rear portion is saved, thus making the process of tensioning and securing the auxilliary ligament much easier for the surgeon and allowing the tensioning to be accurate for the appropriate angle of the channel or bore.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a front view of a first embodiment of a surgical anchor according to the invention;

Figure 2 is a side view of the surgical anchor of Figure 1;

Figure 3 is a front view of a second embodiment of a surgical anchor according to the invention;

Figure 4 is a side view of the surgical anchor of Figure 3; and

Figure 5 is a schematic sectional view of the surgical anchor of Figures 1 and 2 in use.

The surgical anchor 10 shown in Figures 1 and 2 consists of a head portion 12 and a rear portion 14. The head portion 12 is substantially annular in shape and resembles a washer. The rear portion 14 comprises two elongate legs 16 and an end portion 18 fixedly connected together so as to form a general U-shape extending generally rearwardly from the head portion 12. In this embodiment the elongate legs 16 are rigidly connected to the head portion 12 and the end portion 18 and elongate portions 16 are circular in cross section, although they could be of any suitable alternative cross section, e.g. square.

The dimensions of the surgical anchor 10 are chosen so as to be suitable for use in the manner described above. The width w of the rear portion 14, corresponding to the length of the end portion 18, is chosen so as to be a little less than the intended

diameter of the bore or channel through which the auxiliary ligament will pass. The width w of the rear portion 14 will typically be around 8-14mm. The external diameter d of the head portion 12 must be greater than the intended diameter of the bore or channel, and therefore greater than the width w, and will typically be around 16-20mm. The greater the difference between the diameter d and the diameter of the bore or channel, the lower the pressure applied to the bone surface surrounding the bore or channel when the surgical anchor 10 is in use.

The rear portion 14 has an overall length l which is typically 10-20mm although this dimension can be varied according to necessity. The longer the length l of the rear portion 14, the greater the saving in auxilliary ligament when the surgical anchor 10 is in use.

The rear portion 14 extends at an angle α with respect to the plane of the head portion 12. Normally, the angle at which the bore or channel exits the bone in relation to which the surgical anchor is to be used will be known in advance and the angle α will correspond to the said angle. The angle α will be typically around 45°-65°.

The surgical anchor 10 can be formed from any suitable implant-grade material. Preferred materials are Titanium, biocompatible ceramic, ultra high molecular weight polyethylene or high strength

bioabsorbable or bioresorbable materials. The surgical anchor 10 can be formed integrally by moulding or casting, can be machined from a solid block of material, or can be manufactured as a number of separate components subsequently connected together.

A second embodiment of the invention is illustrated in Figures 3 and 4. Figures 3 and 4 show a surgical anchor 20 having a head portion 22 and a rear portion 24 with essentially the same features and characteristics as the embodiment shown in Figures 1 and 2. However, in the second embodiment, the rear portion 24 is connected to the head portion 22 by means of a movable or adjustable joint 30, preferably a universal joint, which allows the angle β between the rear face of the head portion 22 and the elongate legs 26 to be varied to some extent. This joint 30 thus allows a certain amount of inaccuracy in the angle of the bore or channel with respect to the bone surface to be tolerated and also allows for intended variances in the angle of the bone or channel.

The joint 30 is attached to the head portion 22 at the centre of the head portion 22 which prevents the centre of the head portion 22 being removed to save weight and cost of materials. Although not shown in Figures 3 and 4, it is envisaged that the head portion 22 can be formed with cutaway portions to achieve a similar weight and cost saving.

A second difference between the first and second embodiments lies in the design of the elongate legs 16,26. In the first embodiment, the elongate legs 16 are of fixed length. However, in the second embodiment, the elongate legs 26 are adjustable in length. This is achieved by forming each leg 26 of two telescopic parts with interengaging locking means (not shown). If desired, the length of the elongate legs 26 can be adjusted to suit the length of the auxilliary ligament being provided. This could equally be achieved by adding snap-fitting or otherwise removable leg sections.

A method of utilising a surgical anchor as described above is illustrated in Figure 5. In Figure 5, a surgical anchor 10 as shown in Figures 1 and 2 is illustrated although it will be appreciated that a surgical anchor 20 as shown in Figures 3 and 4 could equally be utilised.

In Figure 5, a bore or channel 40 is formed in the appropriate femur or tibia 42 exiting the bone 42 at the desired angle α. The diameter D of the bore or channel 40 is a little greater than the width w of the rear portion 14. Alternatively, the diameter D could be slightly less than the width w, so that the anchor 10 would be inserted with a force fit into the bore or channel 40 thus preventing rotation of the anchor 10. As an alternative way of preventing or hindering rotation of the anchor 10, the under surface of the head

portion 12 abutting against the outer surface of the bone 42 may be textured, or may be coated to enhance bone growth.

The auxilliary ligament 44 is passed through the bore or channel 40 from right to left as seen in Figure 5, through the rear portion 14 of the surgical anchor 10 and back through the bore or channel 40, this time from left to right as seen in Figure 5. As the auxilliary ligament 44 is tensioned, the rear portion 14 of the surgical anchor 10 is drawn into the end of the bore or channel 40 until the head portion 12 abuts against the outer surface of the bone 42. Further movement of the surgical anchor 10 is then prevented and the ligament 44 can be tensioned as appropriate. The ligament 44 passes around the end portion 18 which, as mentioned above, is circular in cross section and therefore does not exert undue stresses on the ligament 44. An advantage of the surgical anchor described above is that the need for bulky screws or staples to attach the ligament to the surface of the bone is obviated. Furthermore, instead of a highly concentrated force of a screw or staple, the head portion 12 spreads the load evenly over the surfaces of the bone adjacent the bore or channel 40.

The effect of the surgical anchor 10 is to shorten the distance along which the ligament 44 has to pass by twice the length l of the rear portion 14. This allows the surgeon a higher degree of manipulation when tying

or anchoring the ends of the ligament 44, and allows a shorter ligament to be used, which is of advantage if this is limited by the prosthetic or graft length available.

The invention is not limited to the embodiments described above. Various modifications and alterations will be apparent to a reader skilled in the art. For example, the overall shape of the head portion can be varied to suit requirements or for aesthetic reasons. Indeed, the head portion could be made expandable so as to allow the entire surgical anchor to be passed through the bore or channel if necessary. The surgical anchor would be passed through the bore or channel with the head in a retracted position and subsequently expanded to allow anchoring to take place. Also, the rear portion need not be as shown in the embodiments; the end portion could be curved or alternatively a single elongate leg may be provided with a loop or eye for receiving the ligament. Other methods of attaching the rear portion to the head portion will also be possible.

CLAIMS

1. A surgical anchor for anchoring a ligament or the like at or adjacent one end of a bore or channel in a bone, the surgical anchor comprising a head portion and a rear portion, the rear portion being adapted to extend into the bore or channel and to receive the ligament or the like.

2. A surgical anchor as claimed in claim 1, wherein the head portion is substantially circular in shape and has a diameter larger than the corresponding dimension of the rear portion.

3. A surgical anchor as claimed in claim 1 or 2, wherein the rear portion is substantially U-shaped in side view.

4. A surgical anchor as claimed in any one of claims 1 to 3, wherein the rear portion extends rearwardly from the head portion at a fixed angle thereto.

5. A surgical anchor as claimed in claim 4, wherein the fixed angle is less than 90°.

6. A surgical anchor as claimed in any one of claims 1 to 3, wherein the rear portion extends rearwardly from

the head portion at an adjustable angle.

7. A surgical anchor as claimed in any one of the preceding claims, wherein the length of the rear portion is between 1cm and 5cm.

8. A surgical anchor as claimed in claim 7, wherein the length of the rear portion is substantially 2.5cm.

9. A surgical anchor as claimed in any one of claims 1 to 7, wherein the length of the rear portion is adjustable.

10. A surgical anchor as claimed in any one of the preceding claims, wherein the anchor is made of titanium.

11. A surgical anchor as claimed in any one of claims 1 to 9, wherein the anchor is made of a bioabsorbable or bioresorbable material.

12. A surgical anchor substantially as hereinbefore described with reference to any one of the embodiments shown in the accompanying drawings.